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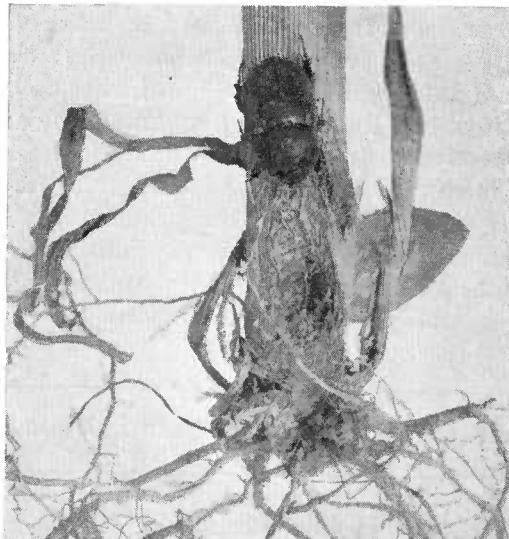
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THE ROUGH-HEADED CORN STALK BEETLE IN THE SOUTHERN STATES AND ITS CONTROL



THE ADULT of the rough-headed corn stalk beetle is responsible for all the injury done to corn by this insect. The grubs live in old, poorly drained pasture land. Therefore, do not plant corn on such lands the first year after they have been broken up.

Drain and thoroughly cultivate all low waste or pasture lands in the vicinity of corn crops.

Plant corn early, by April 20 for tidewater Virginia, and earlier for more southerly States.

Sod land intended for corn should be plowed the last of August or the first of September the summer before planting, to destroy the pupae of the beetles.

Apply barnyard manure or commercial fertilizers in liberal quantities whenever practicable.

Besides explaining fully these control measures this bulletin describes the beetle and its injurious work and tells how it lives throughout the year.

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THE ROUGH-HEADED CORN STALK BEETLE¹ IN THE SOUTHERN STATES AND ITS CONTROL

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THE INSECT discussed in this bulletin as the rough-headed corn stalk beetle does serious damage to corn in many parts of the Southeastern States. It has long been unfavorably known in the Gulf States as the sugarcane beetle, and in Louisiana is recorded frequently as destructive to growing rice.

Only the adult beetle is implicated in any of the depredations, and the information in this bulletin is intended mainly to facilitate its control for the protection of the corn crop.

DESCRIPTION OF THE BEETLE

The beetle (fig. 1) varies somewhat in size, but usually measures about one-half inch in length. It is a stout, hard-shelled, jet black creature. The head and fore part of the body (thorax) appear almost smooth, but the head is in reality finely roughened, and the thorax is covered with numerous minute dots or impressions. The hind body (abdomen) is covered by a pair of hard wing cases which, like the thorax, bear numerous minutely impressed dots or dents and in addition a number of faintly impressed longitudinal lines. The legs are very strong and are provided with a number of coarse spines.



FIGURE 1.—Rough-headed corn stalk beetle: Adult. About twice natural size

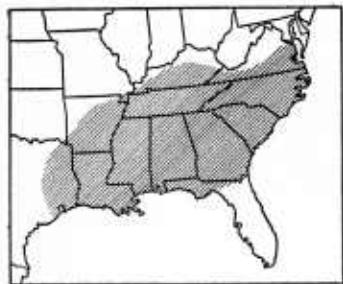


FIGURE 2.—Map showing area in which outbreaks of the rough-headed corn stalk beetle have occurred

DISTRIBUTION AND IMPORTANCE

The insect is found only in the Southern States. (Fig. 2.) There is no record of its occurrence north of Virginia, Kentucky, and Kansas. In Virginia it appears to be limited to poorly drained lands in the eastern part of the State known locally as tidewater Virginia, where, because of its attacks some of the infested fields have been replanted

as many as three times in one season. Many reports of injury to corn by the rough-headed corn stalk beetle have been received from Texas, Georgia, Louisiana, Arkansas, and Alabama. The damage

¹ (*Ligyrus*) *Euctheola rugiceps* Lec.; order Coleoptera, family Scarabaeidae.

² This revision has been made by the senior author.

caused by the insect in these States has been severe and general wherever the nature of the soil was such as to sustain the grubs. There are numerous records of injury also from Mississippi and Tennessee that show that the stalk beetle is an active pest. Field observations show that severe outbreaks, for reasons as yet imperfectly understood, do not necessarily recur in successive years.

MANNER OF INJURY

Injury to corn by the rough-headed corn stalk beetle is done entirely by the adult beetle, as the grub has never been found attacking growing plants. The damage takes place only during spring and early summer. In Virginia the heaviest damage appears to occur

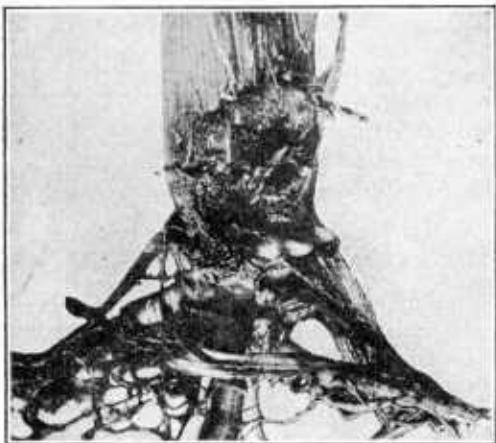


FIGURE 3.—Young corn plant, showing characteristic injury by the rough-headed corn stalk beetle

between May 20 and June 15, although some slight injury may occur as late as the 1st of July. The beetles begin to attack the crop as soon as the plants appear aboveground and continue their attacks until the plants are at least knee-high, or even somewhat taller. Full-grown plants, however, apparently are never injured. The beetle bores into the outer wall of the stalk immediately below the surface of the ground, making a large ragged opening (fig. 3), and destroys the tender growing point or "heart," upon which the beetle appears to feed especially. The destruction of the heart, or bud, is indicated quickly aboveground by the withering of the central roll of leaves, the other leaves retaining their freshness for a considerably longer period. The roll of wilted leaves soon dies and can be pulled out with little effort.

By the time the corn is 3 feet tall the tender growing part of the plant has been pushed above the level of the ground and is rarely reached by the beetles. Consequently, the damage to the plants is not so severe at this stage as at younger stages and the plants recover more readily from the injury.

SEASONAL HISTORY

The rough-headed corn stalk beetle, in common with certain other insects, has four stages in its life cycle, namely, the egg, the grub or larva, the pupa or resting stage, and the adult or beetle stage, the last, as stated, being responsible for the injury to growing corn plants.

The essential facts in the life history are: The eggs (fig. 4) are laid in the early summer, chiefly during June, and are deposited singly or in groups of three or four in the ground wherever the

beetles happen to be feeding. The egg hatches in about two weeks into a small white grub or larva (fig. 5) which often is known locally in the South as a "rich-worm." The grubs are common in mid-summer and grow very rapidly, reaching full growth in about two months. (Fig. 6.) When mature the grub changes into the pupa (fig. 7), which does not feed and is unable to move about. In about two weeks the skin of the pupa splits, and is cast off, and the fully developed beetle (fig. 1) emerges therefrom. The beetles of this new generation appear about the middle of September and soon go into hibernation, there being one generation a year. It is this hibernating or wintering-over generation of beetles that injures corn in the spring.

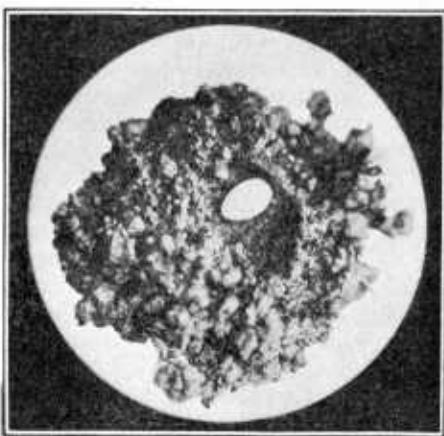


FIGURE 4.—Section of earthen cell containing an egg of the rough-headed corn stalk beetle. Enlarged about 3 diameters

THE EGG

The egg (fig. 4) when first deposited is about the size of the head of an ordinary pin, resembling a hen's egg in shape, and is pearly white and perfectly smooth. It increases in both weight and bulk and just before hatching it is almost round and about twice its original size.



FIGURE 5.—The rough-headed corn stalk beetle: Young larva, or grub. Enlarged about 15 diameters

white, being distinctly darker near the tail end. The legs are pale brown.

The grub does not appear to feed upon any cultivated crop but lives largely upon decaying vegetable matter found in or on the ground.

THE GRUB

The pupa (fig. 7) is about three-fourths inch long by three-eighths inch broad. When it first becomes a pupa it is white but gradually changes to pale brown. During this stage the insect does not feed and remains in one place in the soil, anywhere from 1 to several



FIGURE 6.—The rough-headed corn stalk beetle: Full-grown larva, or grub. Enlarged about 2 1/4 diameters

inches below the surface. In this stage the insect is destroyed easily by cultivating the soil and exposing the pupae to the sun and the attacks of birds, poultry, or hogs.

THE ADULT

The beetle develops within the pupa and when fully formed ruptures the old pupal skin and crawls forth. At first it is almost white, but gradually changes to an intense black. The majority of the beetles emerge in September.

During the fall the beetles spend most of their time in the ground, but on warm days come to the surface to feed. At this time they do not molest corn, but subsist on certain wild grasses which grow abundantly in old pastures and waste areas.

With the advent of cold weather the beetles go into a condition of torpor and pass the winter in hibernation, remaining inactive in the ground. With the reappearance of warm weather in late April or early May they become active once more. If food is present, the beetles usually remain near the place where they passed the winter, but when it is lacking they come to the surface and crawl or fly away in search of a more promising spot. About this time the young corn is beginning to appear aboveground and the beetles, which have passed the winter in the field itself or perhaps have merely wandered into it from some other field where food was scarce, soon discover and attack the young plants. As the season progresses and the temperature rises the beetles become more active, and their appetites are correspondingly more difficult to satisfy. Mating takes place below the surface of the ground, and the eggs are laid shortly

after. Thus the life cycle starts once more. The old beetles continue active until about the middle of June, after which they rapidly decrease in numbers, becoming scarce within a month and disappearing entirely about August 1.

CONDITIONS FAVORABLE TO OUTBREAKS

The natural home of the rough-headed corn stalk beetle is in low, poorly drained open fields which have not been cultivated for a long time. These old sod lands are frequently used as pastures. Whenever they are plowed and immediately planted to corn, or when corn is planted near by, the crop may suffer serious injury from the beetles that had been breeding regularly in the old sod. Such old sod lands support a vegetation in which flourish certain grasses³ of which the beetles appear to be very fond. In such lands dead and decaying vegetable matter accumulates in considerable quantities, and as the grubs of the rough-headed corn stalk beetle feed upon such substances

³ *Paspalum* spp.

it can easily be understood that these old sod lands afford ideal conditions for the multiplication of the pest.

Sometimes the rough-headed corn stalk beetle can develop in small numbers in temporary sod lands and cornfields, and though eggs may be found in abundance in cornfields in which the beetles are feeding, such places, as compared with old sod land, are very unfavorable for reproduction.

Therefore one of the most promising methods for controlling the beetles is not to maintain pastures for indefinite periods or to allow any part of the farm to grow up as waste land.

CONTROL MEASURES

By far the most important means of control is the elimination of all old waste and pasture lands. As has been stated, the favorite breeding place—and, in fact, under most conditions the only place where the pest is able to maintain itself in sufficient numbers to become a menace to the corn crops—is in low, poorly drained land that is allowed to remain as waste or as pasture lands for a considerable time. Land that is kept in a high state of cultivation and on which frequent and systematic rotation of crops is practiced is not a favorable place for the breeding of this beetle. Therefore all low, moist areas should be drained thoroughly and included in the regular system of rotation. This not only will destroy the main breeding grounds of the insect but will make these lowlands more productive and much easier to cultivate. Such pasture lands should not be planted to corn the first year. As the beetle injures no other cultivated crops, except cane and rice, some other crop can be substituted. But since there is only one generation of the beetles a year, the ground may be safely planted to corn the following year.

PASTURING WITH HOGS

When old waste land can not be conveniently drained and included in the regular rotation, the probabilities of injury resulting from their existence as breeding grounds may be eliminated largely by pasturing hogs on such land every year, at least during August and September. It is well known that hogs are very fond of grubs and will root them out industriously and devour them.

EARLY PLANTING

Since most of the injury to corn occurs from the latter part of May to the middle of June, and since young plants succumb to attack much more easily than larger ones, early planting where practicable is recommended as a means of avoiding injury. It has been found that corn planted on April 25 at Tappahannock, Va., suffered much less injury from the rough-headed corn stalk beetle than did plantings made in May. One of the most serious objections to planting so early is that lowlands often are too wet for working in early spring. This can be overcome largely by draining such lands thoroughly.

When planting early, more kernels should be planted to the hill and the plants subsequently thinned if necessary, thereby insuring a better stand.

CHANGE OF ROTATION

As previously stated, corn should not be planted after sod if there is the prospect of injury from the beetle. Besides the rough-headed corn stalk beetle, sod webworms and cutworms are always a source of danger to corn planted on old sod land. Therefore any system of rotation that obviates the necessity of following sod with corn helps to avoid several serious insect pests.

FERTILIZERS

The application of barnyard manure or commercial fertilizers is beneficial, because it hastens growth and enables the corn plants more quickly to reach a stage in which they are less likely to be injured seriously.

HAND PICKING

Hand picking the beetles is at best only a temporary expedient and in most cases very expensive. When a field of growing corn already is infested, however, there is no other hope of relief. Children sometimes may be employed for a small sum to collect and destroy the beetles found in young corn. This work may be done principally when the corn is being either plowed or thinned.

LATE SUMMER PLOWING

The rough-headed corn stalk beetle enters the pupa stage during the latter part of August and it is in this stage that the beetle is most easily destroyed, the least disturbance being sufficient to kill the pupae. For this reason, wherever possible, sod lands should be plowed the last week in August or the first week in September for Virginia, and earlier for more southerly localities.